Critical Thinking:
Theory, Research, Practice, and Possibilities

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Mentkowski, Moeser, and Strait 1983). Finally, several studies have examined connections between epistemological models and other aspects of development and experience (e.g., Benack 1984; Benack and Basseches 1987; Brabeck 1983; King, Kitchener, and Wood 1985; Kurfiss 1975, 1976, 1977; Welfel 1982). (For reviews of research on the Perry model, see King 1978 and Perry 1981.)[1]

Research on women's epistemological development has shown that while the broad categories of the scheme are similar to those identified by Perry, contemporary women frequently differ from the men and women interviewed by Perry in their views of authority, truth, and knowledge (Belenky et al. 1986; Benack 1982).

"Stages" of Intellectual Development[2]

Perry (1970) identified nine sequential "positions from which a person views his world" (p. 48) and three "alternatives to growth" (p. 177ff). Belenky and associates identified four perspectives among college women and an additional perspective among women who were clients in human service agencies. The following summary of intellectual development in college integrates Belenky and associates' extensive research on women's perspectives with the earlier findings reported by Perry. The summary is organized into four major categories or levels and suggests how students at each developmental level will respond to tasks that require critical thinking.

Level 1: Dualism/received knowledge

Many students believe that knowledge is a collection of discrete facts; therefore, learning is simply a matter of acquiring information delivered by the professor in concert with the text. Information is either correct or it is not; hence, Perry's label for this belief system is "dualism." Dualistic thinkers do not realize the degree to which the information presented in a course or textbook is selected, interpreted, and systematized. They view the professor as the authority, presenting factual knowledge known to all experts in the discipline. Their dependence on authority as the source of all knowledge led Belenky and her associates to refer to this belief system as "received knowledge." Professors are always more or less right in this view, because, as one student says, "They have books to look at. Things that you look up in a book, you normally get the right answer" (Belenky et al. 1986, p. 39).

For these students, the concept of interpretation, essential to critical thinking, is puzzling. Doesn't the text mean what it says? Why can't the author just say what he or she means? They may become confused or indignant when professors ask them to reason independently. Here is one student's response to a general education course that emphasizes thinking:

> *"It's supposed to teach you to—ah, reason better. That seems to be the, the excuse that natural science people give for these courses—they're supposed to teach you to arrive at more logical conclusions and look at things in a more scientific manner. Actually, what you get out of that course is you, you get an idea that science is a terrifically confused thing in which nobody knows what's coming off anyway"* (Perry 1970, p. 74).

In the face of "so many conflicting doctrines and opinions," many students in this first level opt "just to keep quiet until [they] really know just what the answer is" (Perry 1970, p. 87). Rather than reflecting a personality characteristic like "passivity" or "vocationalism," their resistance to critical thinking reflects a legitimate developmental quandary as they encounter a world far more complex than they have realized.

Level 2: Multiplicity/subjective knowledge

Before students can accept the challenges and responsibilities of independent thinking, they must recognize that "conflicting doctrines and opinions" are an inevitable and legitimate feature of knowledge. And they must begin to develop trust in their "inner voices" as a source of knowledge. This is the work of the second level of intellectual development as described by Perry and by Belenky and associates.

In some courses, particularly those in the humanities and social sciences, students encounter numerous conflicts of interpretation and theory. Most students gradually acknowledge the existence of unknowns, doubts, and uncertainties, at least in

1. William S. Moore coordinates the Perry Network; his address is 1670 Prince Ave., Athens, GA 30606.
2. The term "stages" implies a more deterministic and integrative concept of development than researchers in this field wish to claim. For this reason, Perry chose the more modest term "positions," and Belenky and associates chose "perspectives."

some areas of knowledge. When the facts are not known, knowledge is a matter of "mere opinion." When no absolute truth exists, one "opinion" is as good as another, and teachers "have no right to call [the student] wrong" on matters of opinion (Perry 1970, p. 97). Many conflicts over grades probably arise from students' failure to understand, or professors' failure to communicate, the criteria used to judge "opinion" papers.

Perry's term "multiplicity" emphasizes this position's departure from dichotomous thinking. Belenky and associates' term "subjective knowledge" highlights women's tendency to turn inward, away from external authorities as their primary source of knowledge. The majority of college students subscribe to this category of epistemological beliefs (Belenky et al. 1986; King, Kitchener, and Wood 1985; Welfel 1982).

Multiplicity/subjective knowledge is a crucial turning point in the development of critical thinking. Students at this level recognize complexity but have not yet learned how to navigate its waters. They perceive no basis other than intuition, feeling, or "common sense" on which to judge the merits of the opinions they now accept as reflections of legitimate differences. They are "make-sense epistemologists" (Perkins, Allen, and Hafner 1983) in their studies of informal argument. A recent popular characterization describes these students as suffering from the "openness of indifference" (Bloom 1987, p. 41). "Openness used to be the virtue that permitted us to seek the good by using reason. It now means accepting everything and denying reason's power" (p. 38).

Level 3: Relativism/procedural knowledge

Insistent pressure from peers (for example, in arguments in the residence hall or coffee shop) and from faculty (to give reasons for opinions offered in class discussions, on examinations, or in term papers) leads some students to realize that "opinions" differ in quality. Good opinions are supported with *reasons.* Students learn that they must examine an issue "in complex terms, weighing more than one factor in trying to develop your own opinion" (Perry 1970, p. 100). In the arts, students learn that they must substitute analysis using "objective" criteria based on factors in the work for personal responses to its mood and character (Belenky et al. 1986). Belenky and associates' term "procedural knowledge" captures this emphasis on using disciplinary methods of reasoning. Perry labels this belief system "relativism," because it assumes that what counts as true depends on (is relative to) the frame of reference used to evaluate the phenomenon in question. Confusion about the meaning of the term "relativism" has led many writers to use the term "contextualism" or "contextual relativism" (see, for example, Clinchy and Zimmerman 1982). Others have used the terms "reflective skepticism" (McPeck 1981) and "critical epistemology" (Perkins, Allen, and Hafner 1983) to describe this way of thinking.

Level 3 beliefs reflect the traditional academic view of reasoning as objective analysis and argument. Belenky and associates noticed, however, that some women employed an alternative procedure for developing opinions, which they called "connected knowledge." Connected knowledge attempts to understand the reasons for another's way of thinking. The student undertakes a "deliberate, imaginative extension of one's understanding into positions that initially feel wrong or remote" (p. 121). Connected knowledge differs from the objective analytical model of thinking, which they called "separate knowledge." Confronting a poem, separate knowers ask, "What techniques can I use to analyze it?" In contrast, connected knowers ask, "What is this poet trying to say to me?" (Belenky et al. 1986, p. 101). Connected knowledge does not preclude analysis or criticism; it does, however, begin with a more empathic treatment of divergent views.

In Perry's study, most students came to realize that the "academic" method of deciding issues is generally applicable, because knowledge is inherently indeterminate. Subsequent studies have found fewer than half of college seniors subscribing to this epistemological perspective (Baxter-Magolda and Porterfield 1985; King, Kitchener, and Wood 1985; Welfel 1982).

Level 4: Commitment in relativism/constructed knowledge

The reasoning procedures of level 3 illuminate a situation, but they do not provide definitive answers. Ultimately, individuals must take a position and make commitments, even though they can have no external assurances of the "correctness" of what they choose to do or believe. Hence, Perry labels this perspective "commitment in relativism."

"Constructed knowledge," as described by Belenky and associates, integrates knowledge learned from others with the "inner truth" of experience and personal reflection. At this level, students understand that knower and known are intimately intertwined and exist in a particular historical and cul-

tural context. Even in the sciences, this realization is possible, as one senior honors student observes:

> *"In science you don't really want to say that something's true. You realize that you're dealing with a model. Our models are always simpler than the real world. The real world is more complex than anything we can create. We're simplifying everything so that we can work with it, but the thing is really more complex. When you try to describe things, you're leaving the truth because you're oversimplifying"* (Belenky et al. 1986, p. 138).

Constructed knowledge as described in *Women's Ways of Knowing* captures the interplay of rationality, caring, and commitment that is the ultimate goal of education. Constructed knowers are able to take "a position outside a particular context or frame of reference and look back on 'who' is asking the question, 'why' the question is asked at all, and 'how' answers are arrived at" (Belenky et al. 1986, p. 139). They include the *self* in their knowing process, no longer executing a procedure but now becoming passionately engaged in the search for understanding. They are committed to nurturing rather than criticizing ideas; they may withdraw into silence if they believe the other person is not really listening, be it spouse, acquaintance, professor, or colleague. They seek integrated, authentic lives that contribute to "empowerment and improvement in the quality of life of others" (p. 152).

Alternatives to growth

Perry identified three alternatives to intellectual growth in the students he interviewed. *Temporizing* is "a pause in growth over a full academic year" (p. 178), *retreat* is a regression to an earlier position, and *escape* may take the form of fatalistic acceptance or gamesmanship. The common theme of these alternatives is, for Perry, the "defeat of care . . . . The speaker always conveys a nostalgia for a care and involvement that once was, or might have been, or might yet be . . . if only . . . " (p. 200).

Differences between Samples

Although the general outlines of these two developmental models are similar, Belenky and associates found several differences between the women in their sample and the men and women in Perry's study.

Most noticeably, particularly in level 1, the men at Harvard identified with the male authority figures they were discussing. In contrast, women in the sample tended not to identify with authorities. The absence of women in key positions in their schools and the negative attitudes toward women's capabilities conveyed by some professors provided little basis for identification, even among women from elite schools in the study.

A second difference is that for women, a central theme is their responsibility to help others. Although it may have been an issue for students at Harvard and Radcliffe, Perry did not explicitly identify it.

A third difference is that for the women interviewed by Belenky and associates, listening or gaining a voice is the dominant metaphor, with a new meaning at each level. Women in the perspective of received knowledge (level 1) report being strongly influenced—and confused—by advice from friends and counselors or by different views in what they read. Expecting to find "answers" outside themselves, they are unable to listen to their own voices, whether to express themselves in class or to decide what to do with their lives. They "resolve" this difficulty by valuing their inner voices almost exclusively in level 2, subjective knowledge. In level 3, procedural knowledge, the outer voice again becomes salient, now telling students *how* to think rather than *what* to think. Level 4, constructed knowledge, describes the integration of inner and outer voices. The metaphor of listening favors interaction with others as a way of knowing. In contrast, Perry's interviewees developed objectivity and distance as ways of knowing, implying an underlying metaphor of *seeing* (Belenky et al. 1986).

Yet another difference is the discovery by Belenky and associates of a perspective that *precedes* dualism/received knowledge. They call this perspective "silence." It is a powerless, dependent view of the self in which the women feared the power of words and cowered in the face of male authority. These women accepted sex-role stereotypes unquestioningly and accepted violence and brutality from men rather than live without them. Escape from silence often occurred when, as new mothers, they visited children's health centers where knowledgeable, supportive professionals treated them with respect and helped them develop confidence in their ability to learn. Silence was not found among women in the college sam-

ple, but the researchers found that many female students had a history of abuse by male authority figures, perhaps accounting for their reluctance to speak and their failure to identify readily with academic authority figures who are so often male (Belenky et al. 1986). Silent knowers share characteristics of illiterate peasants (Freire 1985). Like the women who discovered their own powers of learning, these peasants were "liberated" when they discovered that words could be used to shape the environment they had once thought of as immutable.

A final difference is the discovery of "connected knowledge" as a procedure used to understand unfamiliar ideas. Connected knowledge enables students to develop the supportive relationships that facilitate honest criticism. When teaching students who do not trust or identify with authorities, professors may find an emphasis on connected knowledge breaks down barriers to participation.

Criticisms

Perry's model, although widely used and appreciated by faculty in many disciplines, is not without its critics. For example, Perry himself notes that the beliefs clustered here as "level 4" cease to be epistemological, reflecting instead issues of personal identity, or in Perry's words, "emotional and aesthetic assessments" (p. 205). A proposed alternative, reflective judgment, is a seven-stage model that is more rigorously epistemological (Kitchener and King 1981). The reflective judgment interview asks students to reason about four epistemological dilemmas, such as how one would decide whether a particular food additive is safe. Responses are categorized on three "dimensions" (e.g., cognitive complexity, openness) and seven "content areas" (e.g., view of the nature of knowledge, role of authority, use of evidence) (King 1977, pp. 217–57; see also Kitchener 1977).

The reflective judgment interview has been extensively validated and has provided longitudinal data suggesting a clear directional trend in epistemological development and a significant influence of educational experiences (King et al. 1983; King, Kitchener, and Wood 1985).

Perry's scheme is often taken to mean that students' development is unified, coherent, and linear. Perry himself made no such claim. His choice of the term "positions" reflects his desire to avoid the implications of coherence and endurance implicit in the developmental construct of a "stage." He reports a study in which students' "positions" were rated in five "content-sectors"(academic, extracurricular, interpersonal, vocational, and religious) as well as in overall development or central tendency. The "ratings revealed a considerable disparity in the student's development from sector to sector . . . " (p. 48). Similarly, in another study, students' comprehension of short passages sequenced according to Perry's model was not consistent across a set of five topics related to academic learning and personal decision making (Kurfiss 1977). Another researcher found that women's responses on different topics failed to fall neatly into categories outlined by Perry (Benack 1982). Perhaps disparities in students' understanding of the same position when presented in different content areas reflects differences in their experience in each area (Kurfiss 1977).

Some criticisms of developmental theory are based on misconceptions about what the theories themselves claim. For example, Perry's model has been criticized as suggesting a rigidly linear, maturationist view of intellectual growth (Berthoff 1984), for being insensitive to cultural differences (Bizell 1984, 1986), and for confusing "development" with knowledge of the "conventions" of academic discourse, particularly argumentation (Kogen 1986). These criticisms and related misconceptions about developmental models in general have been analyzed in detail (Hays 1987).

Hays refutes the view that developmental models imply rigid tracking of students in the sense of restricting their intellectual diet to a "comfortable" level. According to Hays, an English professor and composition researcher, developmental theory provides useful insights about why some pedagogies (for example, the highly unstructured "natural process" method of teaching writing) are less effective with some students (for example, dualists/received knowers) because they fail to meet their developmental needs (in this case, the need for structure at least in the initial stages of learning). Developmental theory illuminates students' difficulties in learning to write arguments (Hays 1987; Hays, Brandt, and Chantry 1988); it also suggests how a curriculum might be sequenced to address students' needs more effectively. But categorizing students on the basis of fragmentary evidence is risky business and should be approached responsibly, with the aim of understanding and teaching students more effectively (Hays 1987).

Finally, the two developmental models described here have been criticized for their individualistic view of epistemology.

Perry's concept of contextual relativism does not address the socially constructed nature of the contexts themselves (Broughton 1975). Nor does it question the narrow "drive to advance the self" implied by Perry's highest positions (Harding 1987). "The study's sample includes no women who had the experience of acting collectively in order to change social conditions: Shouldn't this gap make us question the authors' claims about the 'highest' modes of knowledge seeking? Don't they miss something important here—the voices of women aware of the power of women thinking and working together to improve our lives?" (Harding 1987, p. 7). The gap is ironic, as the research was clearly a collaborative project (Harding 1987). The question implies that if cooperative learning becomes more commonplace in schools (as many educators predict or at least hope that it will), epistemological conceptions of future college students—and their professors—will be radically altered.

Relationship to Critical Thinking

Critical thinking skills (as measured by the Watson-Glaser Critical Thinking Appraisal) are probably *necessary* but not *sufficient* for progress to the higher levels of epistemological development. One researcher compared reflective judgment scores of students who scored either very high or very low on the Watson-Glaser assessment (Brabeck 1983). Four educational levels from high school to masters' program were represented; pairs were matched on educational level but differed in assessed critical thinking ability. The two measures were moderately correlated ($r = .40$). Low scorers on the critical thinking test generally scored no higher than stage 4 on the reflective judgment interview. In contrast, 30 percent of the high critical thinking group scored above stage 4 (late multiplicity in Perry's terms). Low-scoring critical thinkers scored no higher than stage 4; the high-scoring groups' maximum was stage 5 (early contextual relativism in Perry's scheme).

The findings support the hypothesis that students who have not learned the "basic skills" of critical thinking subscribe to epistemological views no higher than multiplicity. Students who have learned these skills may indeed progress into a stage equivalent to relativism but do not necessarily do so.

The study illustrates the limitations of instruction in the skills of analyzing and constructing arguments: *Learning these skills does not necessarily alter students' beliefs about the nature of truth or about their role in the construction of knowledge.* Epistemological beliefs change slowly (at most one stage in two years—King et al. 1983), and under present educational conditions, contextual relativism is uncommon even among college seniors (Belenky et al. 1986; King et al. 1983; King, Kitchener, and Wood 1985; Kitchener and King 1981; Welfel 1982). Researchers have found evidence, however, that higher levels of development can be achieved in developmentally supportive contexts (e.g., Clinchy, Lief, and Young 1977) and using developmental principles to plan disciplinary or interdisciplinary instruction (Knefelkamp 1974; Knefelkamp and Slepitza 1976; Widick, Knefelkamp, and Parker 1975; Widick and Simpson 1978).

Students who do not realize that knowledge is contextual may use critical thinking techniques to bolster their preconceived ideas of what is right.

Relationship to Other Behaviors

Some "novice" behaviors described in the section on cognitive psychology have been linked experimentally to students' progress on Perry's scheme. Relationships have been demonstrated between students' beliefs about knowledge and their reading habits, writing standards and performance, and performance in a survey course in psychology (Ryan 1984a, 1984b). Students who agreed with dualistic statements about learning reported reading textbooks for factual knowledge. Their preferred reading strategy was to "recall information from text in response to study guide questions" (Ryan 1984b, p. 252). In contrast, students who disagreed with the dualistic statements, and were thus inferred to subscribe to a more relativistic epistemology, read textbooks in search of conceptual relationships and meaning.

Further, students classified as relativists received higher course grades than those classified as dualists, with the effects of previous academic experience and SAT scores removed (Ryan 1984b). Perhaps, therefore, students' epistemological beliefs generate standards for monitoring text comprehension (Ryan 1984b). Higher standards yield greater comprehension, resulting in superior grades in survey courses where mastery of the text is a major element of performance.

Further, relativistic students used mature criteria for judging organization in written texts (Ryan 1984a). Relativists more often stated that a text must have an organizing principle, either a logical sequence of ideas or a unifying thesis. Dualists more often expressed criteria reflecting informativeness or a simple

grouping of information. And relativists produced more coherent prose when writing a short informative essay in response to a probe about their study behaviors.

A strong association was found to exist between students' epistemological assumptions and the rhetorical strategies they used to persuade a hostile audience of the value of their position on a controversial topic, implementation of tougher drunk driving laws (Hays, Brandt, and Chantry 1988). Rhetorical categories included dogmatic assertions, emotional appeals (including dramatic anecdotes), appeal to facts, logical analysis, and appeal to ethical principles or values. Dualistic students used dogmatic, moralistic assertions and some factual information but no logical analysis, as "presumably their assertions were grounded in a priori truth and needed no such justification" (p. 44). Multiplists offered factual information and problem-solving strategies but seldom used logical analysis. Students whose level of intellectual development included relativistic beliefs used logical analysis and some ethical appeals. They also used more effective audience strategies: building bridges of agreement with the audience, developing their arguments by anticipating possible objections, and offering abundant evidence to support their views. Their responses reflect awareness of context and realization that the assumptions one makes in presenting an argument are not necessarily shared by readers, especially opponents.

Developmental level was a more significant factor in the overall quality of students' writing than was the students' educational level (high school senior to college senior) (Hays, Brandt, and Chantry 1988). Thus, "genuine cognitive thresholds" make it difficult for some students to argue effectively. Sequenced writing instruction and attention to strategies for responding to oppositional readers are recommended to "force writers to explore perspectives and people different from themselves and so loosen their ontological rigidity. Such processes would also of necessity engage them in dialectical thinking, and increases in such thinking should strengthen their argumentative writing" (Hays, Brandt, and Chantry 1988, p. 46).

Another study suggests a strong relationship between relativism and empathy (Benack 1984). The counseling techniques of graduate students classified as "dualistic" or "relativistic" on the basis of interviews conducted at the start of a counseling course revealed that in counseling sessions, dualistic student-counselors failed to focus on the current experiences of the client. In contrast, relativistic student-counselors oriented the conversation toward internal aspects of the client's experience. They used empathic counseling techniques, actively attempting to construct an accurate, flexible model of the client's experience. Relativists were more tentative than dualists, offering hypotheses about the client's concerns and modifying them in response to the client's statements.

The techniques used by the relativistic student-counselors reflect many features of expert problem-solving behavior described in the previous section of this report. They also suggest a genuine attempt to understand the other person, characteristic of connected knowledge, as described by Belenky and associates. Learning to take another person's point of view is important in critical thinking, persuasive writing, and argumentation as well as in counseling.

Mature moral reasoning, which also requires taking a perspective, may depend on epistemological development. A six-year longitudinal study found that reflective judgment interview scores were moderately correlated with a measure of moral development (.48 to .61) (King, Kitchener, and Wood 1985). The level of moral development was found to be "attributable, at least in part, to development of reflective judgment" (p. 9). Similarly, a two-year study of high school students' progress on both moral and epistemological measures found that higher stages of moral development presupposed higher position ratings on Perry's scheme (Clinchy, Lief, and Young 1977). In that study, extraordinarily high levels of both moral and epistemological reasoning were observed in students who were enrolled in a "progressive" high school that emphasized democratic student participation in policy making and active argumentation in classes.

Changing Students' Beliefs about Knowledge

Developmental models help to understand critical thinking as students experience it. Students' resistance to critical thinking frequently arises from one of two fundamental epistemological belief systems: dualism/received knowledge and multiplicity/subjective knowledge. These belief systems are so powerful and pervasive that they can rightly be considered "core misconceptions" comparable in strength to the Aristotelian notions of science identified by cognitive psychologists among college

students and other adults. From the perspective of informal logic, dualism and multiplicity may be construed as *fallacies* (distortions of reasoning) of a very high order.

Virtually every decision involved in planning a course can be viewed through an epistemological lens. For example, the choice of a text—and in fact the decision to use a textbook as opposed to primary source material—is one such decision. Textbooks that present subject matter as nonproblematic reinforce dualistic thinking. In contrast, primary documents or textbooks that present controversies within a discipline challenge students to investigate diverse points of view. Moreover, the kinds of assignments, evaluation criteria, and examinations a professor chooses let students know whether they will have to "think" (i.e., be "relativists"), offer opinions (be "multiplists" or "subjectivists"), or simply memorize in the familiar dualistic fashion. The decision to lecture, use discussions, or employ experiential methods like role play or laboratory or field work similarly contributes to the epistemological structure of the course. Finally, the character of discussion in the classroom communicates important information to students about the view of knowledge the course embodies.

A mismatch between students' epistemological beliefs and the developmental challenges of a course can lead to surprising results. For example, an attempt to teach highly "authoritarian" (dualistic) students the techniques of critical thinking resulted in gains on a test of critical thinking, but it also prompted "internecine warfare" in the class. Students sought evidence to "prove" their points and disregarded evidence favoring their opponents' views. They also demanded a great deal of structure from the instructor, a teaching assistant who was unaware that he was involved in an experiment. Two other groups of students, whose beliefs as described by the authors corresponded more closely to epistemological levels 2 and 3, had no difficulty learning the techniques and applying them rationally; all three groups were taught by the same instructor (Stern and Cope 1956, cited in Jacob 1957, p. 74). Students who do not realize that knowledge is contextual may use critical thinking techniques to bolster their preconceived ideas of what is right (Nickerson 1986b). They may also claim that the professor who attempts to teach them to think is neglecting a fundamental responsibility: to present the "facts" of the subject.

Developmentalists hold that beliefs about knowledge can be influenced toward greater complexity by challenging students' simplistic conceptions while supporting their attempts to manage complexity to the degree necessary to foster intellectual risk taking (Sanford 1966). *Challenges* appeal to what Perry terms "the urge to progress," while *supports* honor "the urge to conserve" or retain one's current identity (Perry 1970, p. 52). Optimal challenge occurs when instruction embodies epistemological assumptions one level beyond the students' present belief system (Hunt 1966; Knefelkamp and Slepitza 1976; Kurfiss 1975; Widick 1975; Widick, Knefelkamp, and Parker 1975; Widick and Simpson 1978). Thus, for students whose beliefs correspond to those of level 1, the optimal challenge is the idea that diverse views can be legitimate. For level 2, the expectation that opinions must have reasons and can be challenged on rational grounds optimally challenges their subjectivist assumptions. At level 3, affirming a position amid uncertainty is a challenge that requires courage and integrity as well as rationality.

What counts as support also differs for students at different developmental levels. Received knowers benefit from affirmation of the worth of their own inner resources. Reassurances and guidelines reduce the risks of openness to new ideas. A cooperative, peer-oriented classroom atmosphere is valued by students in multiplicity, and peers become increasingly important sources of learning as students develop (Baxter-Magolda 1987). Procedural knowers benefit from recognizing that disciplinary methods supplement and enhance their inner voice rather than supplanting or silencing it (Belenky et al. 1986). A caring, interested teacher who respects the student is valued in some form at all levels (Baxter-Magolda 1987). A sense of community with others engaged in a common quest, derived "from reciprocal acts of recognition and confirmation" of the risks students take in caring, provides important support, especially at higher levels (Perry 1970, p. 213).

To provide an "optimal" balance of challenge and support, it helps to have an idea of the developmental levels of students in the course. Formal assessments include the measure of intellectual development (Knefelkamp and Moore n.d.), the measure of epistemological reflection (Baxter-Magolda and Porterfield 1985), and the reflective judgment interview described earlier. Instructors can estimate their students' developmental perspectives using a short questionnaire like the one devised by Ryan (1984a, 1984b) or one tailored to the content of the

course (Mortensen and Moreland 1985). A measure under development, called the instructional strategies inventory, provides a profile of students' instructional preferences as a class, which can be compared to the professors' assessment of the developmental requirements of the course (Kurfiss 1987).

Virtually every model for teaching thinking and fostering intellectual development advocates extensive student-teacher and student-student discussion, but engaging students in classroom dialogue is not always easy. Dialogue in college classrooms is scarce; teachers' questions are dominated by requests for factual information (Barnes 1983; Boyer 1987; Hamblen 1984). Class discussions often stay at the level of "quiz shows," "rambling bull" sessions, or "wrangling bull" sessions (Roby 1983, 1985). In quiz shows, students answer information questions posed by the teacher. Quiz shows reinforce dualism and received knowledge. Opinion-sharing conversations are called "rambling bull" sessions. If the discussion leader or a student introduces a "controversial turn" (a question that invites disagreement), the discussion becomes an argument in which participants ardently advocate the correctness of their opinions; this type of dialogue is called a "wrangling bull" session. Bull sessions reinforce multiplicity/subjective knowledge. In these quasi-discussions, no true exchange or thoughtful evaluation of ideas takes place.

True discussions (informational, problematical, dialectical, and reflexive) provide valuable experiences in reasoned discussion of complex, open-ended questions for students in the first three developmental levels. In an informational discussion, the teacher encourages students to speak, defers controversy, and lets students know their ideas will not be evaluated. A "problem-posing" query can shift discussion to consideration of the broader base of information or values needed to address the issue intelligently; this type is a "problematical" discussion. The "devil's advocate" is a request that participants state opposing views accurately and sympathetically. The devil's advocate encourages "dialectical discussion," in which students synthesize diverse opinions into a new formulation of the issue or agree to disagree but with a better understanding of the nature of their differences. Finally, discussion may be "reflexive" in that participants discuss their own discussion in an attempt to learn from the process (Roby 1983, 1985).

By sequencing questions to guide discussion through these four types, the professor provides structure and clarification of divergent views needed by level 1 students. The opportunity to express their opinions, initially without evaluation, supports level 2 students as well. Requests for elaboration step up the challenge of the discussion for all students; use of the devil's advocate "cools down" the conversation, providing reassurance that nobody will be "made wrong." Reflecting on the discussion, perhaps using the categories presented here, enables students to learn about the process of argumentation and encourages them to take greater responsibility for their contribution to the quality of classroom discourse (Roby 1983). Using this model, instruction can cycle through a developmental sequence many times during a semester, allowing students gradually to become more comfortable and more adept in the use of relativistic thinking. (For examples of questions for each form of discussion, see Roby 1983 and 1985, as well as Alvermann, Dillon, and O'Brien 1987 and Dillon 1984).

In any discussion, the professor's responses to students' contributions influence their willingness to contribute further. Effective response strategies include praising and building on students' responses (Smith 1977), directing comments and questions to other students, and remaining silent (Dillon 1984).

Conclusion

Developmental theories describe how students learn to step outside their frame of reference, to recognize that they are reasoning from within a specific context. Understanding students' progressive transformations as knowers enables faculty to appreciate the gradual and often painful path students must tread to recognize the uncertainty of what was once truth for them and to acknowledge legitimacy in perspectives that differ from their own.

To engage students in critical thinking thus calls upon educators to do more than teach the mechanics of analyzing arguments. They must entice students who await "received knowledge" in a dualistic world to entertain the notion that diverse points of view on a subject exist and are legitimate; having achieved this step, they must persuade "subjective knowers" that the existence of inner truth and pluralism does not preclude substantive judgment. They must encourage students to take the point of view of others, even when students object. To intensify students' involvement in learning, they must facilitate integration of students' personal concerns with their quest for deeper knowledge of the subject.